SIXNET® User Manual

VersaTRAK & Mini-VersaTRAK

Remote Terminal Units

Installation and Maintenance

Contents at a Glance:

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Applicable standards and certifications:

ISO 9001 — Total Quality

cULus LISTED — Hazardous Locations

cULus — Standard Locations

CE — European Directives

DNV — Marine & Offshore

FC — US Emissions

This manual applies to the following products:
All VersaTRAK RTUs (VT-A#-###-##P)
All Mini-VersaTRAK RTUs (VT-M#-###-##P)

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PROTECTED TECHNOLOGY POLICY

SIXNET protects your investment in SIXNET systems with long-term planned technology and our unique Protected Technology Policy. We will continue to support the specified capabilities of standard SIXNET products for at least five years. We plan each product improvement and new feature to be upward compatible with existing designs and installations. Our goals are to make each new software release bring new power to your SIXNET systems and have every existing feature, applications program and data file continue to work.

We protect your investment even further with a liberal five-year trade-in policy. Exchange standard products for upgraded versions of the same product to take advantage of new features and performance improvements at any time for five years. A prorated trade-in allowance will be given for your existing equipment.

SIXNET protects your long-term productivity with state-of-the-art planned technology and continued support.

STATEMENT OF LIMITED WARRANTY

SIXNET, manufacturer of SIXTRAK, VersaTRAK, RemoteTRAK and EtherTRAK products, warrants to Buyer that products manufactured by SIXNET will be free from defects in material and workmanship. SIXNET's obligation under this warranty will be limited to repairing or replacing, at SIXNET's option, the defective parts within 1 year of the date of installation, or within 18 months of the date of shipment from the point of manufacture, whichever is sooner. Products may be returned by Buyer only after permission has been obtained from SIXNET. Buyer will prepay all freight charges to return any products to the repair facility designated by SIXNET.

This limited warranty does not cover losses or damages that occur in shipment to or from Buyer or due to improper installation, maintenance, misuse, neglect or any cause other than ordinary commercial or industrial applications, This limited warranty is in lieu of all other warranties whether oral or written, expressed or implied. SIXNET's liability shall not exceed the price of the individual unit which is the basis of the claim. In no event shall SIXNET be liable for any loss of profits, loss of use of facilities or equipment or other indirect, incidental or consequential damages.

INSTALLATION AND HAZARDOUS AREA WARNINGS

These products should not be used to replace proper safety interlocking. No software-based device (or any other solid-state device) should ever be designed to be responsible for the maintenance of consequential equipment or personnel safety. In particular, SIXNET disclaims any responsibility for damages, either direct or consequential, that result from the use of this equipment in any application.

All power, input and output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods and in accordance with the authority having jurisdiction.

WARNING – EXPLOSION HAZARD – SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS 1, DIVISION 2.

WARNING – EXPLOSION HAZARD – WHEN IN HAZARDOUS LOCATIONS, DISCONNECT POWER BEFORE REPLACING OR WIRING MODULES.

WARNING – EXPLOSION HAZARD – DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS.

Note: All information in this document applies to VersaTRAK and Mini-VersaTRAK RTUs, except where otherwise noted. Refer to the SIXNET I/O Tool Kit software online help system for detailed product specifications and configuration settings.

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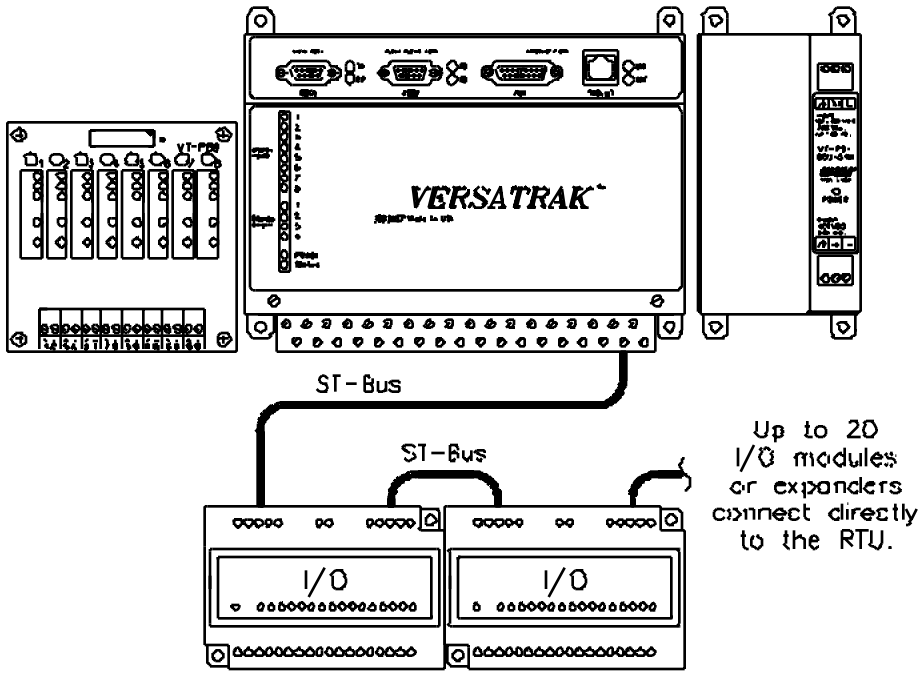
Introduction

VersaTRAK and Mini-VersaTRAK are open systems Remote Terminal Units that provide direct field wiring connections to a wide variety of industry devices. These RTUs and Windows software form a high performance, flexible I/O system.

A typical VersaTRAK or Mini-VersaTRAK station consists of a DC power supply, an RTU and optional expansion I/O modules. SIXTRAK Expansion I/O modules connect to the RTU through a daisy-chained "ST-Bus" cable. RemoteTRAK and EtherTRAK I/O modules connect to the RTU through RS485 and Ethernet, respectively. SIXTRAK modules are shown in the diagram below.



Typical VersaTRAK and MINI-VersaTRAK Components

Expansion I/O Modules

Eight additional discrete I/O points can be added to any VersaTRAK or Mini-VersaTRAK RTU by using the VT-PB8 expansion board. This board accepts single point plug-in modules in any combination. The VT-PB8 connects to the RTU through a supplied 20 conductor ribbon cable.

All VersaTRAK and Mini-VersaTRAK RTUs have a ST-Bus port that can control up to 20 SIXTRAK I/O modules directly. Up to 128 modules can be connected to the ST-Bus port by using a SIXTRAK I/O expander (part number ST-EX-001-20U) after each 20 modules. All SIXTRAK I/O modules are supported by VersaTRAK and Mini-VersaTRAK RTUs.

RemoteTRAK I/O modules can be connected directly to the RS485 port of a VersaTRAK or Mini-VersaTRAK. If an RS485 port is not available, then an RS232 port and an RS232 to RS485 converter (SIXNET part number RM-232-485-4U) can be used. All RemoteTRAK I/O modules are supported by VersaTRAK and Mini-VersaTRAK RTUs.

EtherTRAK I/O modules can be connected through hubs and other off-the-shelf Ethernet media to the Ethenet port of a VersaTRAK. All EtherTRAK I/O modules are supported by VersaTRAK RTUs.

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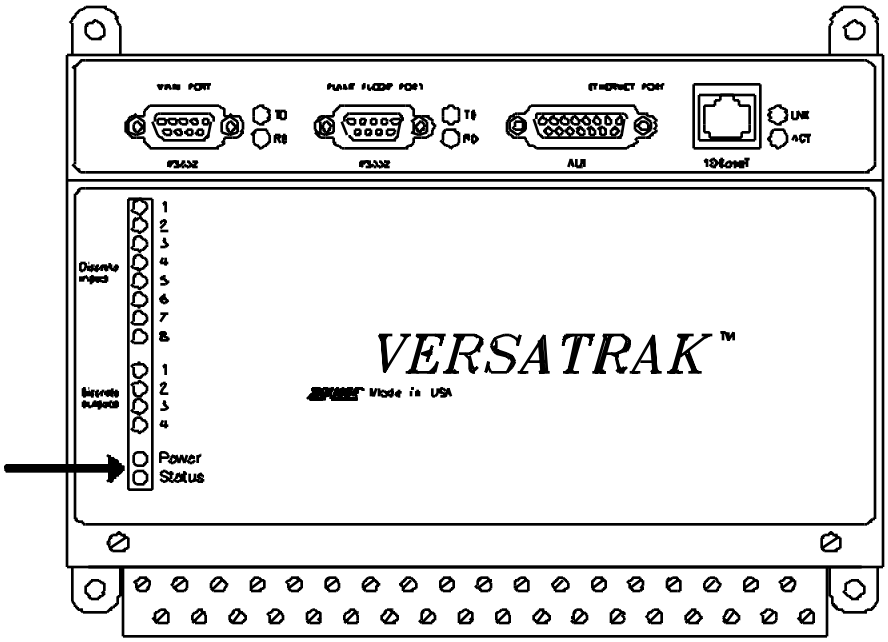
Power, Status LEDs

Each VersaTRAK or Mini-VersaTRAK RTU has a Power LED, and a status LED that indicates configuration and communication status by blinking in different ways. The status LED is documented fully in Section 9.



Isolation

Every on-board discrete I/O channel is isolated from logic circuitry and from any expansion I/O modules for fault-free operation. Additional levels of isolation are provided with SIXTRAK I/O modules. Refer to the product specifications in the SIXNET online help files for more information.

SIXNET Software Tools

SIXNET supplies the "mission oriented" tools you need for every step of your project from the initial specification, through startup, and years of trouble free operation. Configuration information flows between **SIXNET** Windows, saving you time (you don't have to enter data multiple times) and dramatically reducing data entry errors. Refer to the on-line help in each program for details.

SIXNET I/O Tool Kit

The SIXNET I/O Tool Kit is a configuration, calibration and maintenance tool for VersaTRAK and Mini-VersaTRAK RTUs. Use the SIXNET I/O Tool Kit to specify VersaTRAK systems, create a bill of materials and price the system. Then configure I/O features, perform channel-by-channel calibrations in meaningful engineering units, and perform live diagnostics at each RTU.

IOmap

Control Room

Control Room IOmap is a shared resource database that enables multiple Windows programs to simultaneously access **SIXNET** I/O. Built-in scan tasks allow communication over serial ports, Ethernet and **SIXNET** networks. The Control Room talks to your applications with a flexible combination of DDE, Modbus protocol, and direct DLL function calls (from Visual Basic and C/C++). Access the IOmap functions from within the SIXNET I/O Tool Kit.

Sixlog

Sixlog

Sixlog is datalogging software for VersaTRAK and Mini-VersaTRAK RTUs. Data is logged into protected memory in the RTU. Then Sixlog uploads the data files and saves them into ASCII format files that are easy to import into databases, spreadsheets and other Windows applications. Access the Sixlog functions from within the SIXNET I/O Tool Kit.

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Getting Started

Following these steps will make installation and start-up easier.

❶ Mount the Hardware

If you purchased a VersaTRAK Packaged System, the complete enclosure is ready for installation on any flat surface. If you purchased individual VersaTRAK components, refer to Section 2 for information on installing them into an enclosure.

❷ Install ST-Bus Wiring to the I/O Modules

Make ST-Bus wiring connections between the VersaTRAK or Mini-VersaTRAK and expansion modules (if any). Refer to Section 3 for ST-Bus wiring guidelines. If you have a VersaTRAK Packaged System, this has already been done for you.

❸ Connect Power and I/O Wiring

Connect AC power to the power supply. Make DC power connections from the power supply to the VersaTRAK or Mini-VersaTRAK RTU and to the I/O modules (as needed.) Make field wiring connections to the VersaTRAK or Mini-VersaTRAK I/O channels and any peripheral equipment. Refer to the individual module sections in this manual for connection details.

❹ Install Communication Cabling

If you did not purchase a factory communication cable (ST-CABLE-PF), fabricate and install an RS232 cable between your computer and the Plant Floor serial port on the VersaTRAK or Mini-VersaTRAK RTU. See Section 9. If you have a VersaTRAK Packaged System, a factory cable (ST-CABLE-PF) has been supplied.

Fabricate and install RS232, RS422 and RS485 cables as needed. See Section 9. If you are using Ethernet, install the correct cabling and peripherals. Refer to the documentation for your Ethernet communication devices for details.

❺ Apply Power

Power up the RTU and related peripherals. Observe the status LED on the RTU and each I/O module. The normal conditions are as follows:

Module Type	LED, Normal Indication
VersaTRAK RTU in any enclosure	Power and Status LEDs On
SIXTRAK I/O modules in Packaged System	Status LEDs On (ready)
SIXTRAK I/O modules in user enclosure	Status LEDs Blinking (setup is needed)

Refer to Section 9 if a Power or Status LED is not lit as shown above.

❻ Configure Using the SIXNET I/O Tool Kit Program

Refer to the steps on the next page to create a hardware configuration for each RTU. Refer to the on-line help in the SIXNET I/O Tool Kit program.

❼ Test the Hardware

Use the Test I/O function in the SIXNET I/O Tool Kit program to verify proper I/O operation in all VersaTRAK or Mini-VersaTRAK stations. Refer to the SIXNET I/O Tool Kit on-line help.

❽ Configure Your Computer Using IOmap

Begin with the "IOmap" step on the next page to create and test a configuration for your computer. Refer to the on-line help in IOmap for more information.

❾ If You Have Difficulty

If you experience startup trouble, refer to Section 9 of this manual. The diagnostic procedures in this section may help point you to the source of the problem.

Using SIXNET Windows Software

Note: An expanded version of this page has been provided as on-line help. To access it, click on the Getting Started icon in the SIXNET I/O Tool Kit program.

Run the SIXNET I/O Tool Kit program and create your panel layouts. Then configure operating parameters for the RTU and I/O modules, including channel tag names. Save this information to a project file. Link the expansion I/O modules (if any) and load your configuration to the RTU. Using the Test I/O function, verify that you can read and write your I/O. Then exit the SIXNET I/O Tool Kit.

Note: Set tag name restrictions in the SIXNET I/O Tool Kit program before creating tag names to ensure compatibility when exporting them for usage in other Windows applications.

Your VersaTRAK or Mini-VersaTRAK I/O is now ready to run. If you will be running a Windows application that requires an I/O driver such as Control Room, then continue with the following steps.

IOmap

Create a Control Room IOmap from within the SIXNET I/O Tool Kit. You will be presented with an Autoload option. If you use it "Yes", an IOmap will automatically be created for your system. When prompted, select/configure the communication devices and protocol servers. Resave your project file. Then choose the Run command from the Operations menu to load the map into your computer's memory.

Open the Test I/O window and verify that your I/O is being read and written. Then exit the Test I/O window.

Your computer is now ready to exchange I/O data with your Windows applications. (Refer to the "How to Access **SIXNET** I/O From a Windows Application" topic in the SIXNET I/O Tool Kit online help.)

Some Windows applications, such as ISaGRAF, Citect and Intellution FIX, can import **SIXNET** tag names. If your Windows application supports this feature, run the SIXNET I/O Tool Kit and open your project file. Export your tag names to a file using the appropriate format.

Note: If you are exporting tag names for ISaGRAF, Citect or Intellution, you must create, or already have, a project to export tag data into.

Power Switch

You can use the Power Switch utility to provide automatic startup of the Control Room IOmap when you start Windows on your computer. Refer to the Power Switch help topics in the SIXNET I/O Tool Kit online help.

Sixlog

If you will be logging data in the VersaTRAK RTU, then create the appropriate datalog configuration(s) and load them into the RTU. Refer to the Sixlog topics in the SIXNET I/O Tool Kit online help for details.

If you are using the ISaGRAF IEC1131 programming software, refer to the **SIXNET** - ISaGRAF on-line help for additional information.

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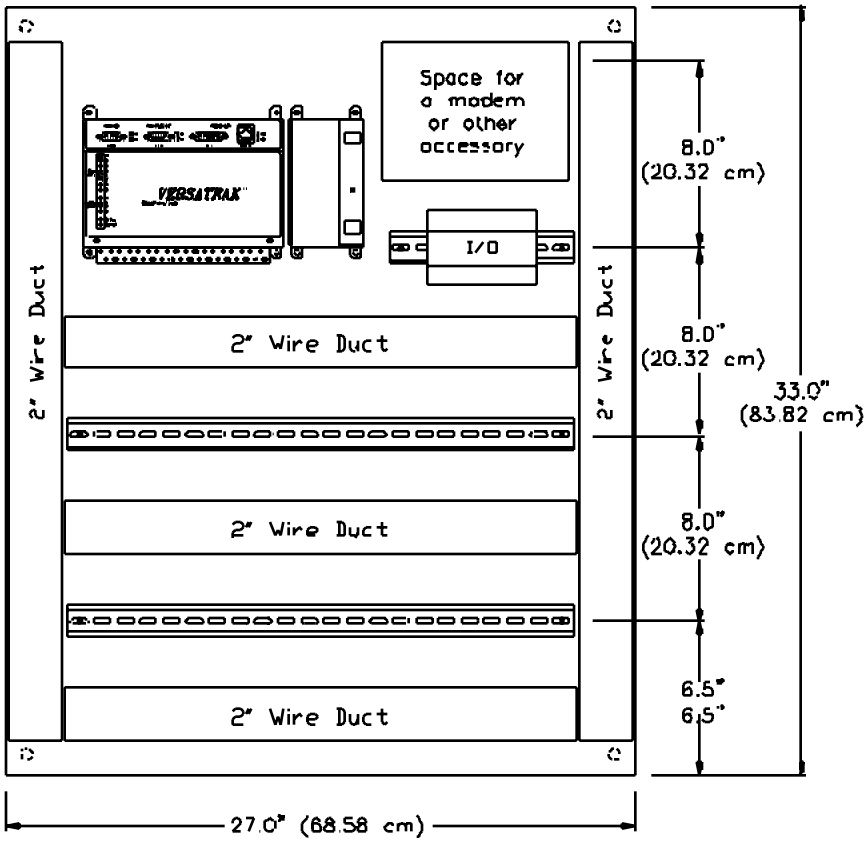
Panel Assembly

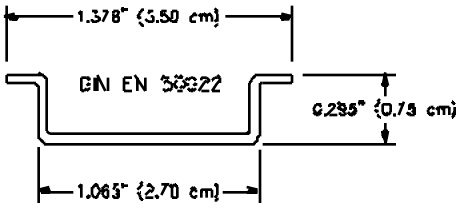
A VersaTRAK or Mini-VersaTRAK RTU and power supply mount directly to the subpanel in your enclosure. SIXNET I/O modules snap onto DIN rail strips fastened to the subpanel. Recommended DIN rail spacing is 8 inches (20 cm). This spacing allows room for wire duct to be installed without obstructing field wiring installation.

SIXNET I/O modules are typically installed against one another, but space can be left between modules to accommodate other DIN rail mounted components such as terminal blocks. End clamps are recommended to restrict side-to-side movement. Upcoming figures show the physical dimensions of the VersaTRAK components. Refer to the manuals for SIXNET I/O modules for their mounting dimensions.

SIXNET I/O and RTU components can be installed in any orientation and order on your panel. The modules are typically interconnected using ST-Bus wiring, beginning with the VersaTRAK RTU. Refer to Section 3 for more information on ST-Bus wiring.

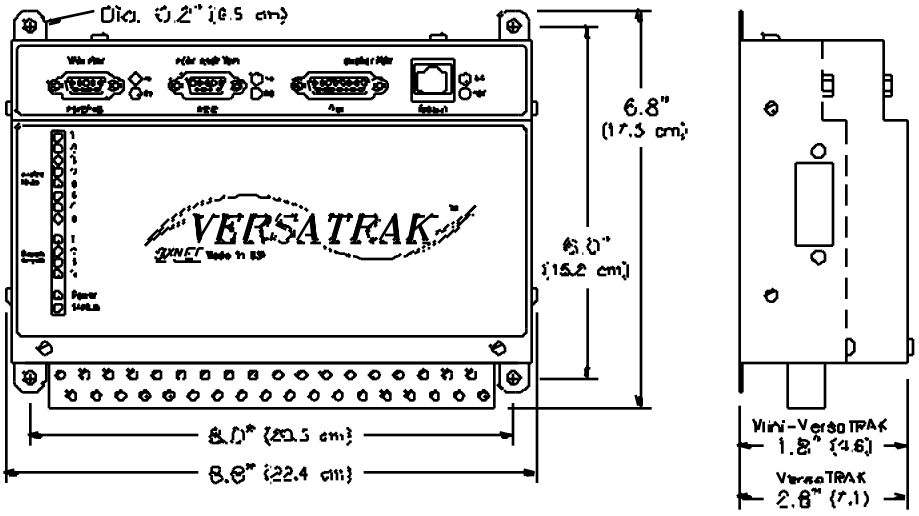
Sample Panel Layout For a 36" x 30" Enclosure



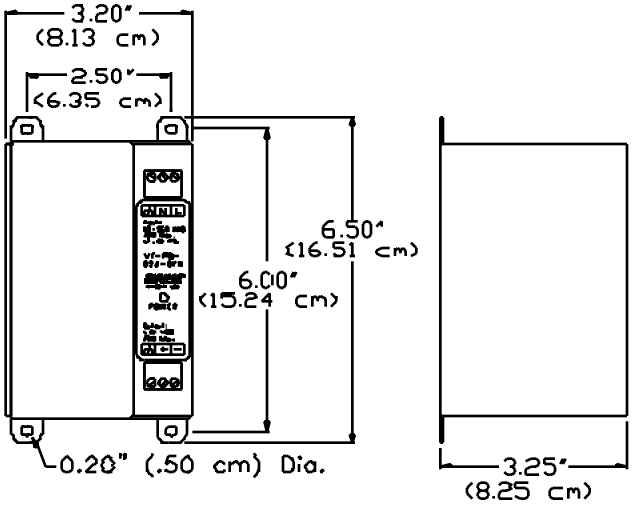


DIN EN 50022 Suppliers

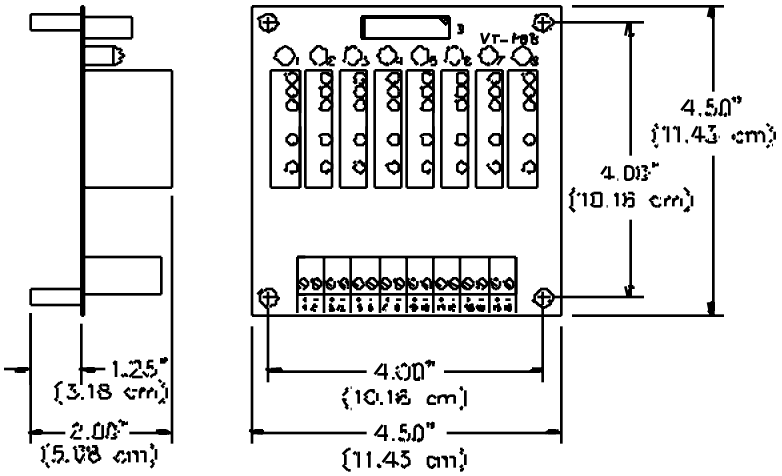
Manufacturer	Type
Altech	PR30
Entrelec	TS35
Phoenix	NS35/7.5
Wago	TS35
Weco	H-35
Weidmuller	TS35
Wieland	TS35



VersaTRAK, Mini VersaTRAK RTU Dimensions



VT-PS-024-01N Power Supply Dimensions



VT-PB8 I/O Board Dimensions

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Power Requirements

VersaTRAK and Mini-VersaTRAK RTUs, SIXTRAK I/O expanders and all SIXNET I/O modules accept 24 volts DC from a VersaTRAK power supply (VT-PS-024-01N) or from a user DC power source. (See below.)

A VersaTRAK or Mini-VersaTRAK RTU will power up to 20 SIXTRAK I/O modules through the ST-Bus port wiring. Any additional (beyond 20) SIXTRAK I/O modules must receive their power from SIXTRAK I/O expanders (ST-EX-001-20U).

DC power for RemoteTRAK and EtherTRAK I/O modules is provided through direct connections to each module. Refer to the SIXNET Product Catalog for power consumption ratings of each module.

AC Power Wiring and Fusing

The VT-PS-024-01N power supply operates on 90V to 260V sinusoidal AC power at 47 to 63 Hz. If fusing is required, use a 1 amp slow blow fuse for 110 VAC. For 220 VAC use a 0.5 amp slow blow fuse.

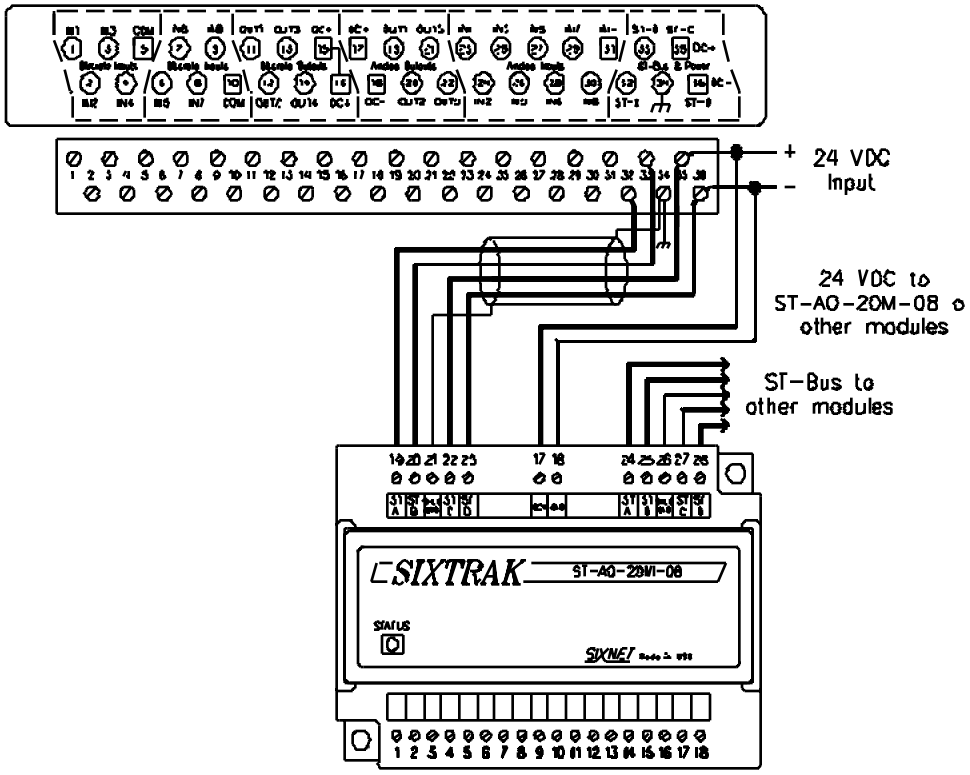
DC Power Wiring (VT-PS-024-01N)

The VersaTRAK or Mini-VersaTRAK RTU, SIXTRAK I/O expanders and user instrumentation loops can be powered from the VT-PS-024-01N power supply. The VT-PS-024-01N supplies 24 volts DC at a maximum of two amps.

DC Power Wiring (User DC Source)

The VersaTRAK or Mini-VersaTRAK RTU, I/O expanders and user instrumentation loops can be powered from a single DC source from 18 to 30 volts. A DC power source of 10 to 30 volts can be used if no SIXTRAK I/O modules are connected to the ST-Bus port.

To calculate the current requirements, add the wattage required for the RTU and SIXNET I/O modules in use, then divide the total wattage by the DC power source voltage. Then add any current needed for user instrumentation loops.



VersaTRAK DC Power and ST-Bus Connections

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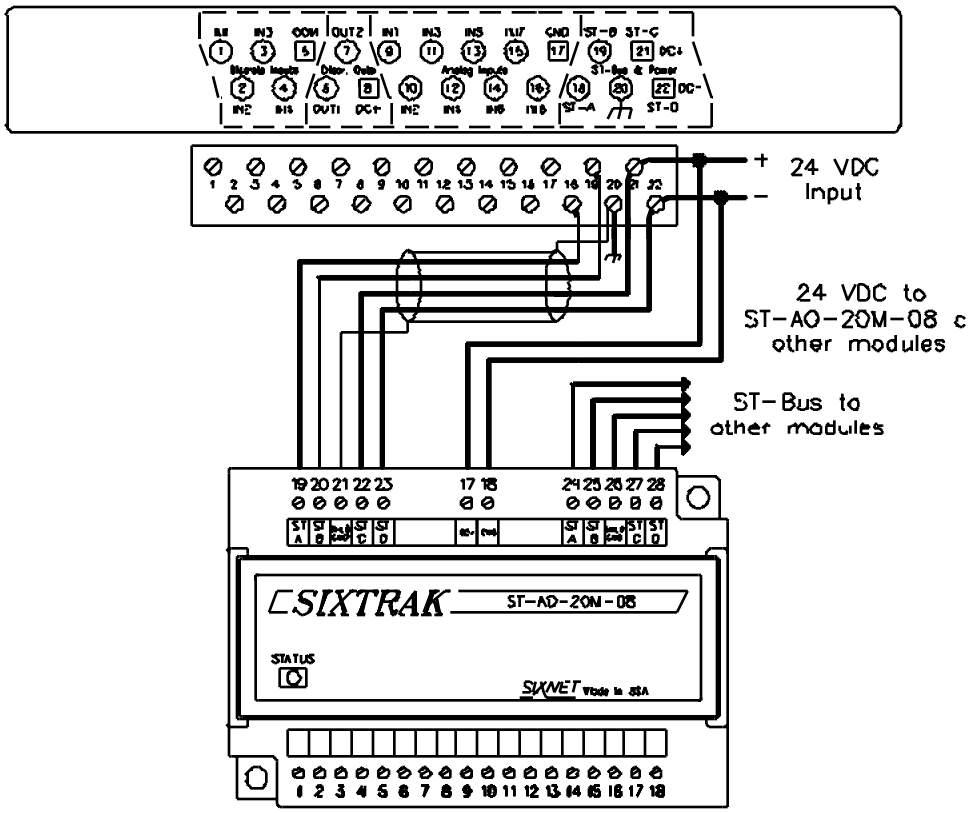
ST-Bus Wiring

Connect ST-Bus wiring between SIXTRAK expansion I/O modules and the VersaTRAK RTU as shown in the diagram below. Refer to the SIXTRAK Installation and Maintenance user manual for ST-Bus wiring guidelines. Connections for the Mini-VersaTRAK are shown on page 10.

Screw Terminal Torque

Tighten the screw terminal on the VT-PS-024-01N power supply and optional VT-PB8 discrete I/O board to a maximum of 3.48 in-lbs. Tighten the screw terminals on the VersaTRAK and Mini-VersaTRAK RTUs to a maximum of 7.00 in-lbs.



Mini-VersaTRAK DC Power and ST-Bus Connections

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VersaTRAK Discrete Inputs

The VersaTRAK RTU has eight on-board discrete input channels that accept DC signals from 10 to 30 volts.

DC Input Wiring

There are two groups of four discrete input channels. Within each group, one wire from each of the four input signals is connected to a single common terminal. Up to eight signals may be connected to the VersaTRAK RTU in sourcing or sinking configurations. Refer to the diagram below for sample wiring connections.

Discrete Input Group Isolation

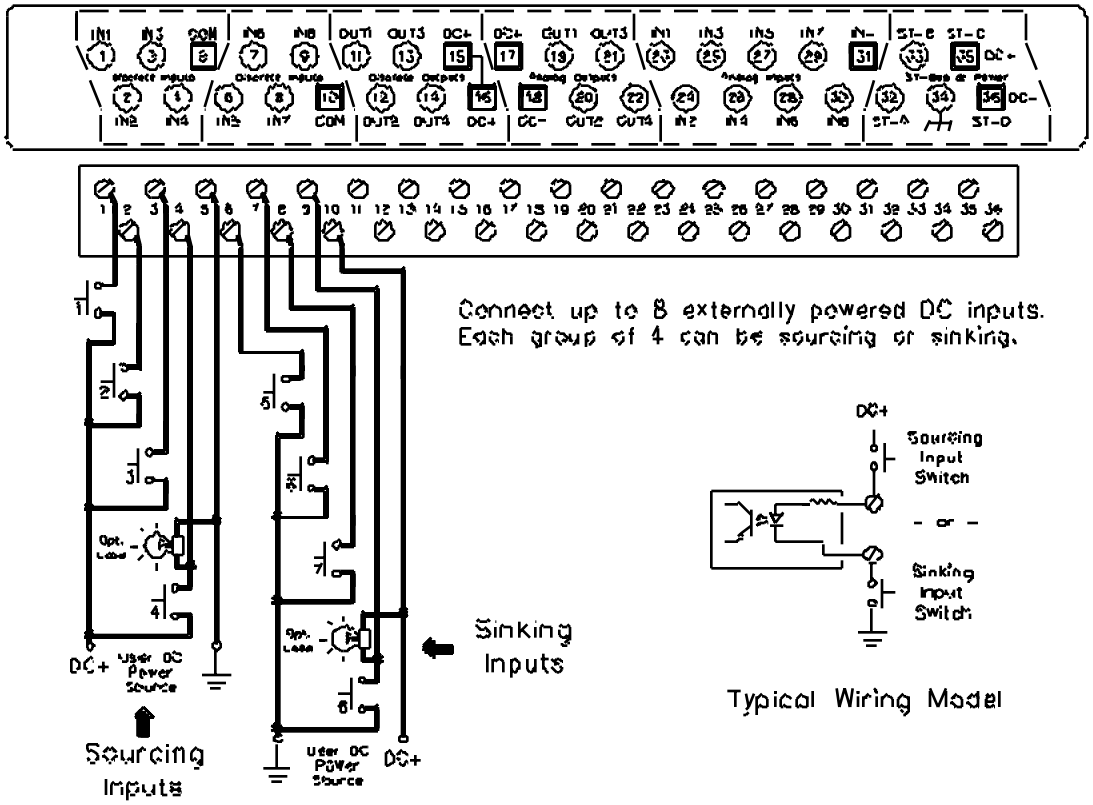
The eight discrete inputs are optically isolated (in groups of four) from each other and from the VersaTRAK circuitry and expansion I/O modules.

Sinking or Sourcing Wiring

DC inputs are typically wired in a sourcing configuration as shown in the upcoming diagram. VersaTRAK DC input channels will read either DC sinking or sourcing wiring. To configure sinking DC wiring, connect the positive power input to the COM terminal for the group of four channels.

Counter Feature

All eight discrete input channels have an input count accumulator feature. If this feature is enabled (in the SIXNET I/O Tool Kit), an analog input register will report a unipolar (unsigned) 16-bit count value that increments on each OFF to ON transition of the corresponding input. The maximum count input rate is 100 Hz (6000 pulses/min). These accumulations initialize at zero each time power is cycled. They cannot be reset under software control.



VersaTRAK On-board Discrete Input Connections

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Mini-VersaTRAK Discrete Inputs

The Mini-VersaTRAK RTU has four on-board discrete input channels that accept DC signals from 10 to 30 volts

DC Input Wiring

One wire from each of the four input signals is connected to a single common terminal. Up to four signals may be connected to the Mini-VersaTRAK RTU in sourcing or sinking configurations. Refer to the diagram below for sample wiring connections.

Discrete Input Group Isolation

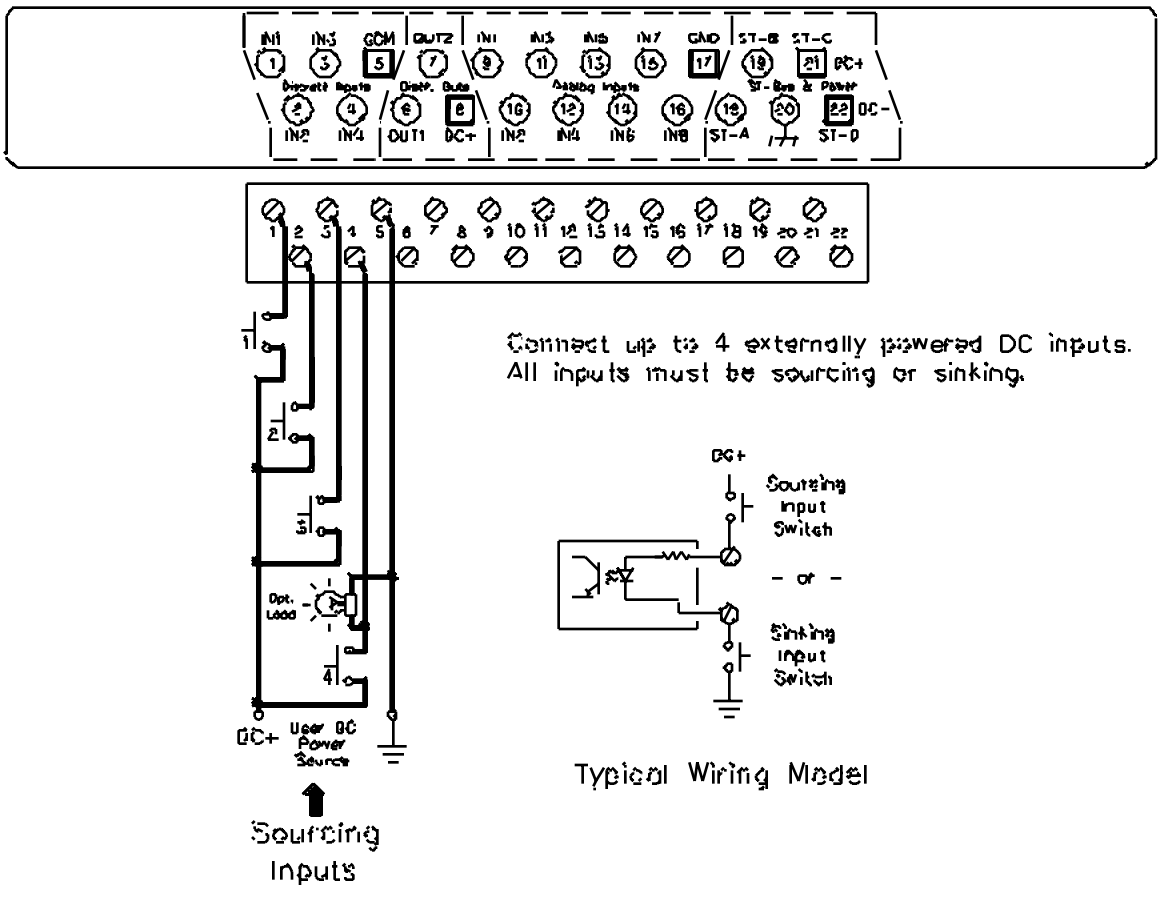
The four discrete inputs are optically isolated (in groups of four) from each other and from the Mini-VersaTRAK circuitry and expansion I/O modules.

Sinking or Sourcing Wiring

DC inputs are typically wired in a sourcing configuration as shown in the upcoming diagram. Mini-VersaTRAK DC input channels will read either DC sinking or sourcing wiring. To configure sinking DC wiring, connect the positive power input to the COM terminal for the four channels.

Counter Feature

All four discrete input channels have an input count accumulator feature. If this feature is enabled (in the SIXNET I/O Tool Kit), an analog input register will report a unipolar (unsigned) 16-bit count value that increments on each OFF to ON transition of the corresponding input. The maximum count input rate is 100 Hz (6000 pulses/min). These accumulations initialize at zero each time power is cycled. They cannot be reset under software control.


IN1 IN3 COM OUT2 IN1 IN3 IN5 IN7 GND ST-B ST-C
1 3 5 7 9 11 13 15 17 19 21 DC+
Discrete Inputs
Analog Inputs
ST-Bus & Power
2 4 6 8 10 12 14 16 18 20 22 DC-
IN2 IN4 OUT1 DC+ IN2 IN4 IN6 IN8 ST-A ST-D
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
Connect up to 4 externally powered DC inputs.
All inputs must be sourcing or sinking.
DC+
Sourcing Input Switch
- or -
Sinking Input Switch
Opt. Load
DC+ User DC Power Source
Sourcing Inputs
Typical Wiring Model

Mini-VersaTRAK On-board Discrete Input Connections

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VersaTRAK Discrete Outs

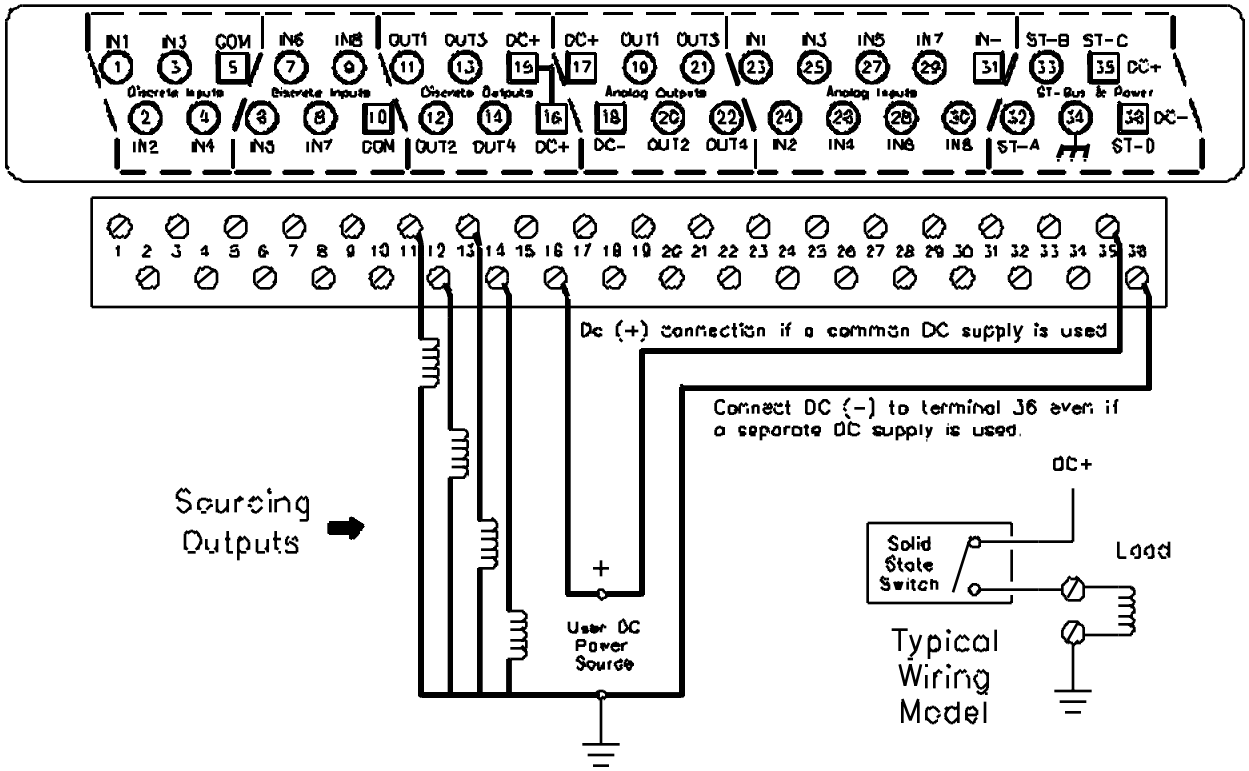
The VersaTRAK RTU has four on-board discrete output channels that switch power from 0 to 30 volts DC at a maximum of 1 amp per output. VersaTRAK wiring connections and features are detailed below.

DC Power Requirements

These discrete outputs switch user supplied DC power. This power source may be separate from the DC power that runs the VersaTRAK, or the same DC power source may be used. If a separate DC power source is used, connect the DC (-) of that power source to the DC (-) terminal 36 on the VersaTRAK RTU.

DC Output Wiring

The user DC power (+) wire is connected to either of the two DC(+) terminals (15 and 16) on the VersaTRAK RTU. This power will be passed to the OUT terminal of a given channel when that output is turned on by your control software. Up to four devices may be connected to the VersaTRAK RTU in sourcing configurations only. Refer to the diagram below for sample wiring connections.


IN1 IN3 COM IN6 IN8 OUT1 OUT3 DC+ DC+ OUT1 OUT3 IN1 IN3 IN5 IN7 IN- ST-B ST-C
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 DC+
Discrete Inputs
Discrete Inputs
Discrete Outputs
Analog Outputs
Analog Inputs
RT-Bus & Power
2 4 8 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 DC-
IN2 IN4 IN3 IN7 COM OUT2 OUT4 DC+ DC- OUT2 OUT4 IN2 IN4 IN6 IN8 ST-A ST-D
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Dc (+) connection if a common DC supply is used
Connect DC (-) to terminal 36 even if a separate DC supply is used.
Sourcing Outputs
+
User DC Power Source
DC+
Solid State Switch
Load
Typical Wiring Model

VersaTRAK On-board Discrete Output Connections

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Mini-VersaTRAK Discrete Outs

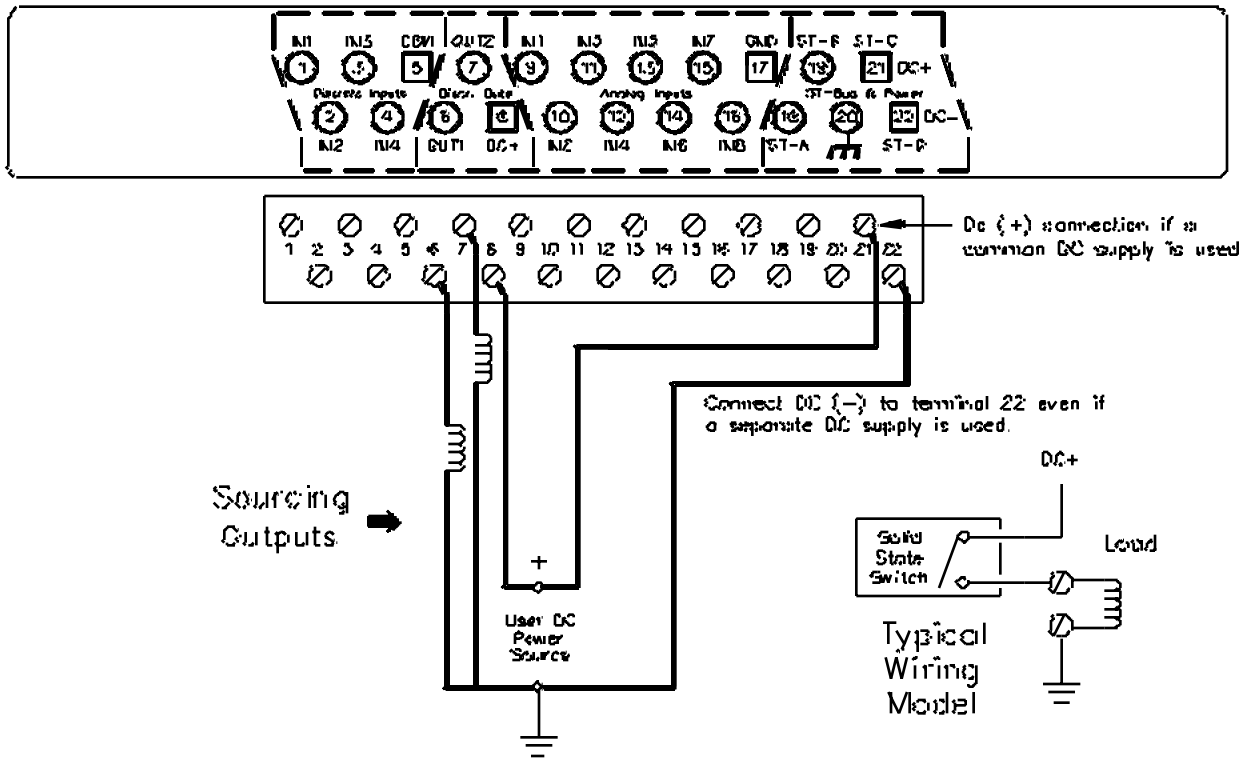
The Mini-VersaTRAK RTU has two on-board discrete output channels that switch power from 10 to 30 volts DC at a maximum of 1 amp per output. Mini-VersaTRAK wiring connections and features are detailed below.

DC Power Requirements

These discrete outputs switch user supplied DC power. This power source may be separate from the DC power that runs the VersaTRAK, or the same DC power source may be used. If a separate DC power source is used, connect the DC (-) of that power source to the DC (-) terminal 22 on the Mini-VersaTRAK RTU.

DC Output Wiring

The user DC power (+) wire is connected to the DC(+) terminal 8 on the Mini-VersaTRAK RTU. This power will be passed to the OUT terminal of a given channel when that output is turned on by your control software. Up to two devices may be connected to the Mini-VersaTRAK RTU in sourcing configurations only. Refer to the diagram below for sample wiring connections.


Dc (+) connection if a common DC supply is used
Connect DC (–) to terminal 22 even if a separate DC supply is used.
Sourcing Outputs
+
User DC Power Source
DC+
Solid State Switch
Load
Typical Wiring Model

Mini-VersaTRAK On-board Discrete Output Connections

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Overview

The VT-PB8 is a discrete I/O expansion board for VersaTRAK and Mini-VersaTRAK RTUs. This board has eight isolated discrete I/O channels and connects to the RTU through the supplied ribbon cable. Each discrete I/O channel may be configured as an input or an output by plugging in the appropriate I/O module and defining the channel as an input or output in the SIXNET I/O Tool Kit configuration.

Discrete Input Wiring

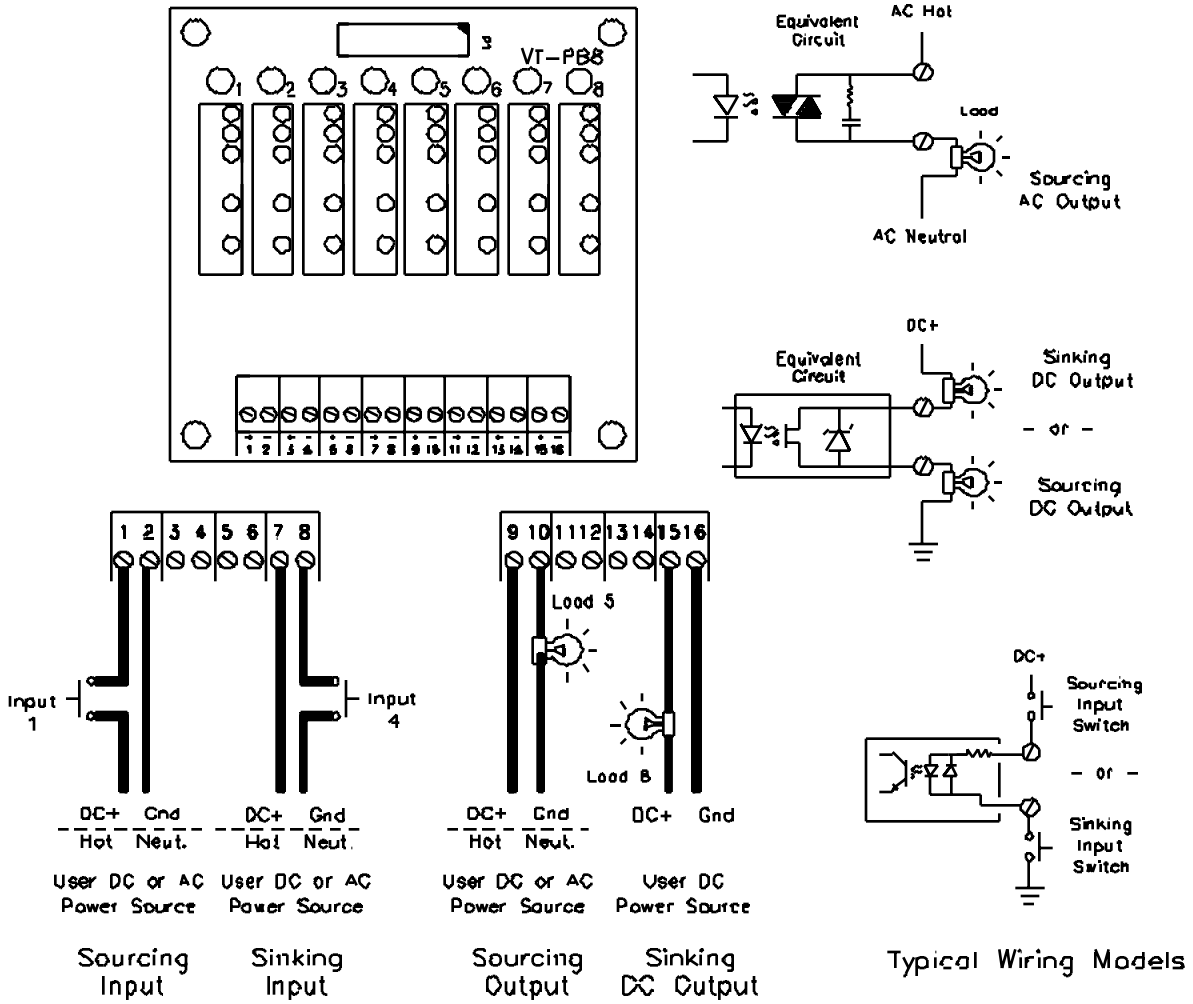
Up to eight input signals may be connected to the VT-PB8 in sourcing or sinking configurations. Refer to the diagram below for sample wiring connections.

Discrete Output Wiring

Up to eight output circuits may be connected to the VT-PB8 in sourcing or sinking configurations. Refer to the diagram below for sample wiring connections.

Power Requirements

VT-PB8 discrete outputs switch user supplied power. The AC or DC power source may be separate from the DC power that runs the VersaTRAK. If DC outputs are populated, the same DC power source may be used for the VersaTRAK or Mini-VersaTRAK, and for the VT-PB8 discrete outputs.



VT-PB8 Discrete I/O Connections

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VersaTRAK Analog Inputs

The VersaTRAK RTU has eight analog input channels that accept loop powered or self powered 4-20 mA signals.

Analog Input Wiring

One screw terminal (31) is provided for the return wires from all input channels. One terminal is provided for each analog input signal. If any of your 4-20 mA transmitters require loop power, connect 24 VDC into the loop as shown below. (The 24 VDC may come from an external DC power source or from the VT-PS-024-01N power supply.) Connect all self-powered 4-20 mA input field devices as shown in the diagram below.

Analog Input Group Isolation

The eight VersaTRAK analog input channels are isolated (as a group) from the VersaTRAK circuitry and expansion I/O modules.

Analog Input Scaling

These 4-20 mA inputs are reported as unscaled values from 0 to 32767. Refer to the SIXNET I/O Tool Kit online help system for more information.

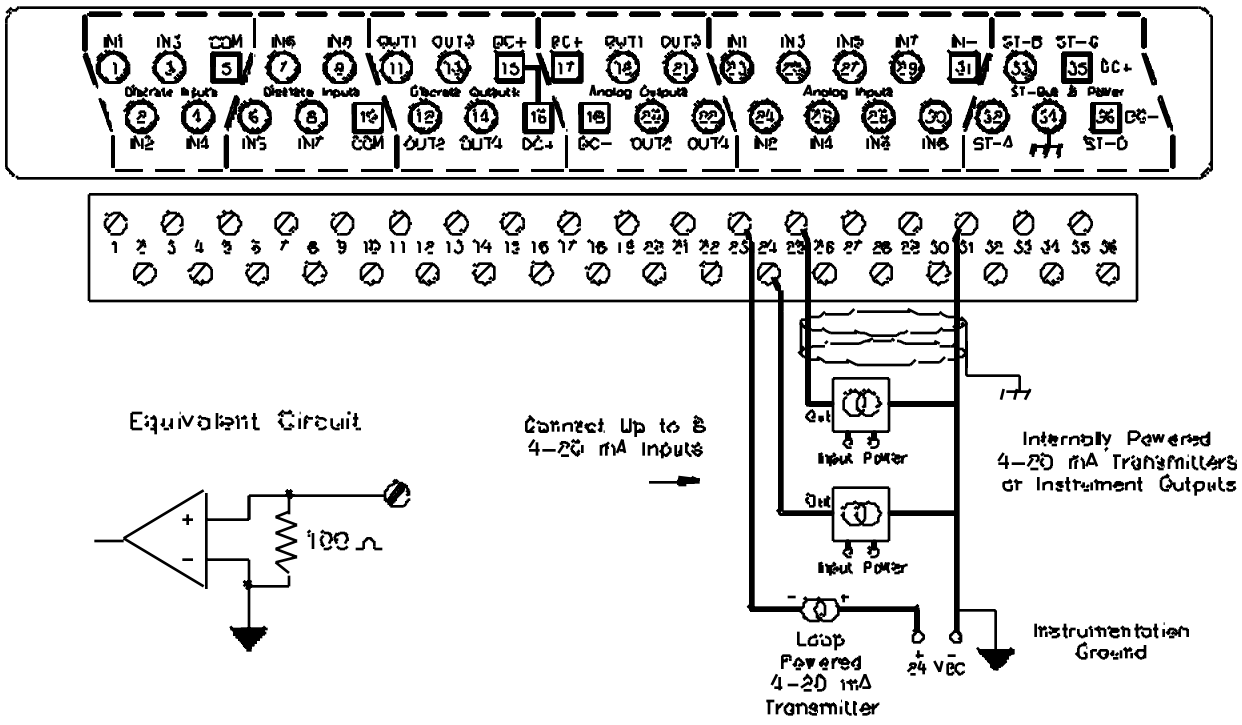
Open Loop Detection Feature

The SIXNET I/O Tool Kit configuration program provides a selection that allows inputs below 4 mA to be reported as zero, or be reported as negative values to detect loop failure.

Replaceable Current Shunts

VersaTRAK RTUs have a replaceable 100 ohm precision current shunt for each analog input, should a faulty field device or wiring error causes the original shunt to overheat.

Note: Shunt replacement requires VersaTRAK disassembly. Consult **SIXNET** for details should shunt replacement become necessary.



VersaTRAK On-board Analog Input Connections

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Mini-VersaTRAK Analog Inputs

The Mini-VersaTRAK RTU has eight analog input channels that accept loop powered or self powered 4-20 mA signals.

Analog Input Wiring

One screw terminal (17) is provided for the return wires from all input channels. One terminal is provided for each analog input signal. If any of your 4-20 mA transmitters require loop power, connect 24 VDC into the loop as shown below. (The 24 VDC may come from an external DC power source or from the VT-PS-024-01N power supply.) Connect all self-powered 4-20 mA input field devices as shown in the diagram below.

Analog Input Scaling

These 4-20 mA inputs are reported as unscaled values from 0 to 32767. Refer to the SIXNET I/O Tool Kit online help system for more information.

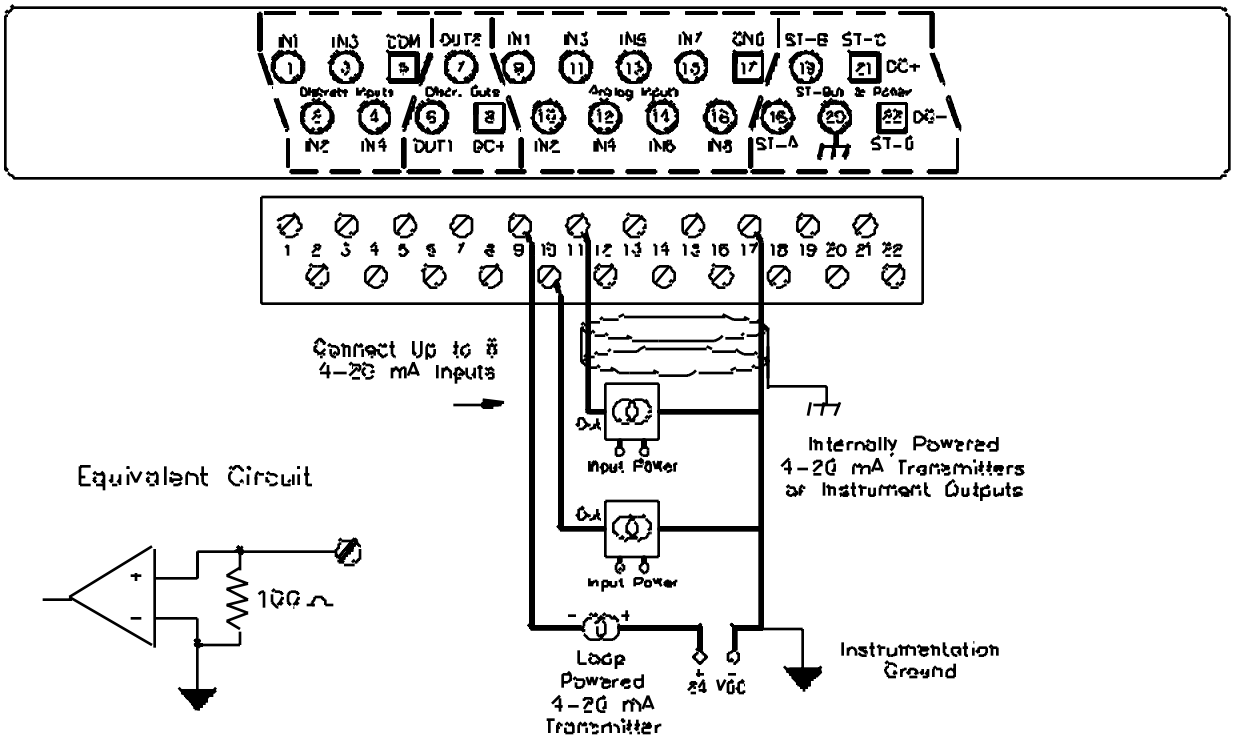
Open Loop Detection Feature

The SIXNET I/O Tool Kit configuration program provides a selection that allows inputs below 4 mA to be reported as zero, or be reported as negative values to detect loop failure.

Replaceable Current Shunts

Mini-VersaTRAK RTUs have a replaceable 100 ohm precision current shunt for each analog input, should a faulty field device or wiring error causes the original shunt to overheat.

Note: Shunt replacement requires Mini-VersaTRAK disassembly. Consult **SIXNET** for details should shunt replacement become necessary.



Mini-VersaTRAK On-board Analog Input Connections

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Applicable Part Numbers

This section documents the following VersaTRAK RTU models:

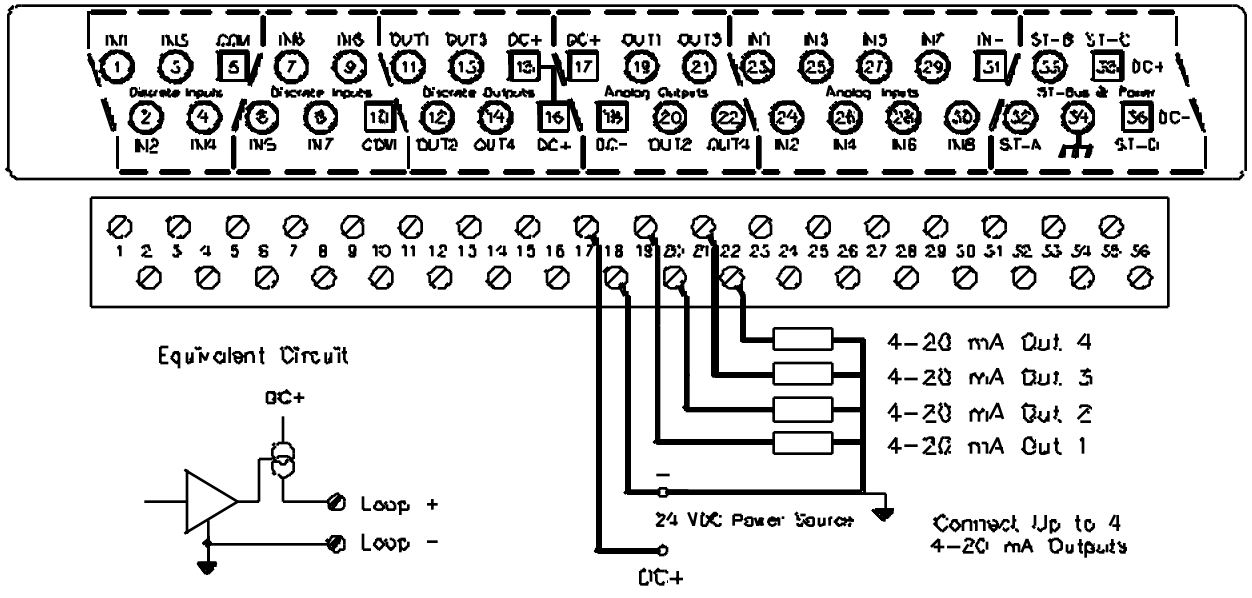
VT-A3-220-24P, 44P, or –54P
VT-A3-222-24P, -44P, or –54P
VT-A3-22E-24P, -44P, or –54P
VT-A3-420-24P, -44P, or –54P
VT-A3-422-24P, -44P, or –54P
VT-A3-42E-24P, -44P, or –54P

VersaTRAK Analog Outputs

The aforementioned VersaTRAK models have four 4-20 mA analog output signals. These outputs are powered from a DC power source. The 24 VDC may come from an external DC power source or from the VT-PS-024-01N power supply.

Analog Output Wiring

Two screw terminals are provided for the DC power source. One terminal is provided for each output signal. The DC (-) terminal is used for the return wire of each analog output circuit.



VersaTRAK On-board Analog Output Connections

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Communication ports

All VersaTRAK and Mini-VersaTRAK RTUs have two communication ports; a Plant Floor port and a Main port. Optionally, a VersaTRAK RTU can have two additional RS232 ports or an Ethernet port. The Mini-VersaTRAK model VT-M2-224-xxP has an additional RS485 port. All VersaTRAK / Mini-VersaTRAK communication ports support **SIXNET** Universal protocol (default) and Modbus ASCII / RTU protocols. The baud rate and other communication parameters for all ports are assigned in the SIXNET I/O Tool Kit. (Refer to the SIXNET I/O Tool Kit online help for information on setting communication parameters.)

Plant Floor Port (All Models)

The Plant Floor RS232 port provides a connection to any RS232 device, typically a computer. Plant Floor serial port wiring is shown on page 20.

Main Port (All Models)

The Main port is an RS232 or RS422/RS485 port, depending on the VersaTRAK or Mini-VersaTRAK model. The main port may be connected to any RS232 or RS422/RS485 device, or in some cases, may be connected to other RTUs in a passthru configuration. (See below.) Wiring examples for each type of main port are shown on upcoming pages.

RS485 Port (VT-M2-224-xxP)

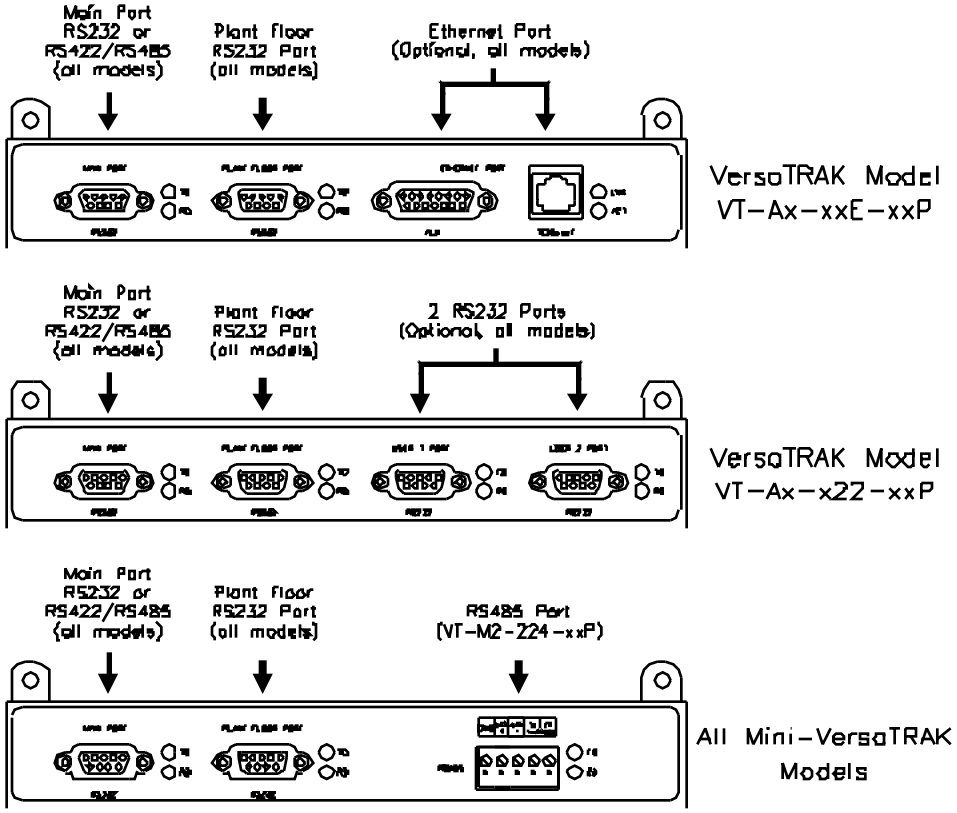
This RS485 port can be used for two-wire communication to RS485 devices such as RemoteTRAK I/O modules. SIXNET and Modbus protocols are supported.

VersaTRAK Optional Communication Ports

The two optional RS232 User serial ports can be used for communication to RS232 devices.

The optional Ethernet port is accessible through the supplied 10BaseT or AUI connectors, but not both. The VersaTRAK RTU will automatically monitor both connectors for network traffic. Once activity is located on a connector, the VersaTRAK RTU will only monitor that connector for messages until power is cycled.

All standard Ethernet devices and communications media are supported.



VersaTRAK / Mini-VersaTRAK Communication Ports

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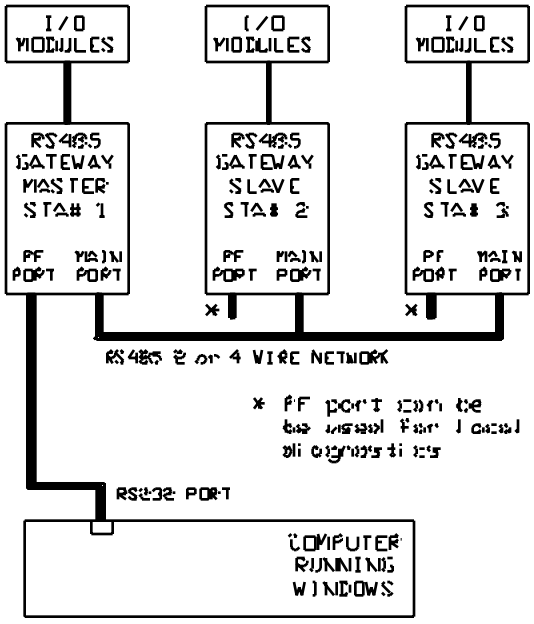
Passthru Mode Overview

Passthru mode is a communication choice for VersaTRAK and Mini-VersaTRAK RTUs. This selectable mode lets an RTU function as a RS232, RS422/485 or Ethernet converter or radio modem master, thus eliminating the need for a special communication board in your computer. For example, you can use passthru mode to communicate to Ethernet or RS422 / RS485 gateways from a single serial port on your computer.

In the SIXNET I/O Tool Kit configuration, when you enable a passthru connection, the RTU will bidirectionally pass messages between the two specified ports (RS232, RS422/RS485 or Ethernet). Up to two passthru connections may exist on a VersaTRAK RTU.

Connections to passthru stations are documented in the upcoming pages. Please note that passthru mode requires version 2.08 or newer gateway/RTU firmware to function properly.



Typical RS485 Passthru Connections

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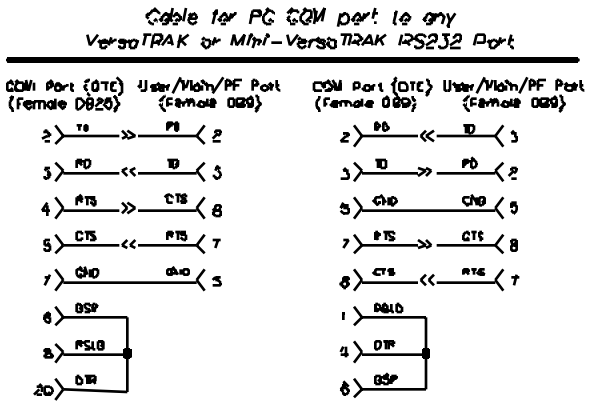
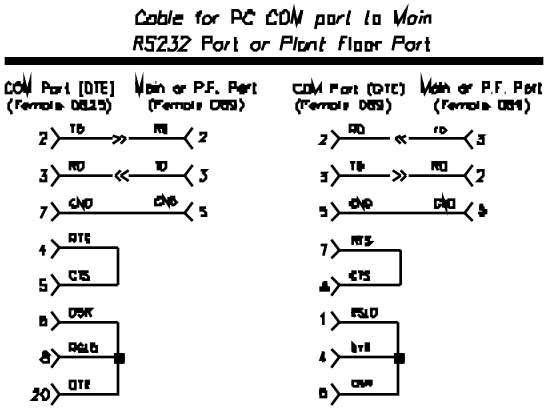
Plant Floor Port Wiring

All VersaTRAK and Mini-VersaTRAK RTUs have a Plant Floor RS232 port to service external commands. The Plant Floor port has a maximum baud rate of 38,400. It supports either Modbus or **SIXNET** Universal protocols. This port is intended to provide a connection for your laptop computer running **SIXNET** Windows software tools.

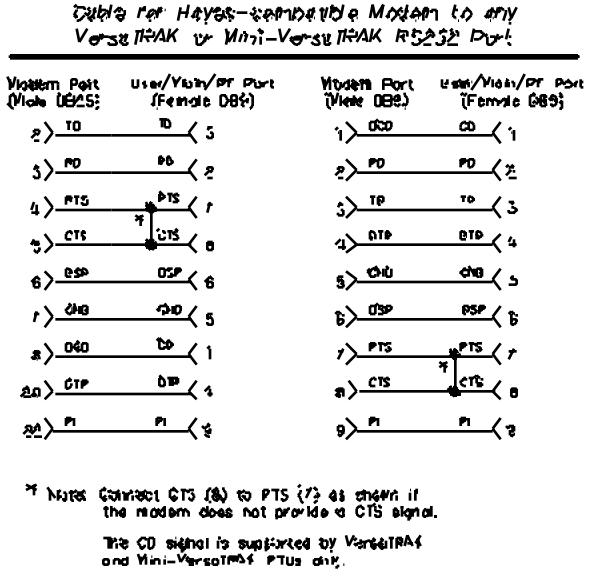
Sample cable connections to the Plant Floor port are shown below. Pinouts for the optional ST-CABLE-PF (factory cable) are also shown.


Cable for PC COM port to any VersaTRAK or Mini-VersaTRAK RS232 Port
COM Port (DTE) (Female DB25)
User/Main/PF Port (Female DB9)
COM Port (DTE) (Female DB9)
User/Main/PF Port (Female DB9)

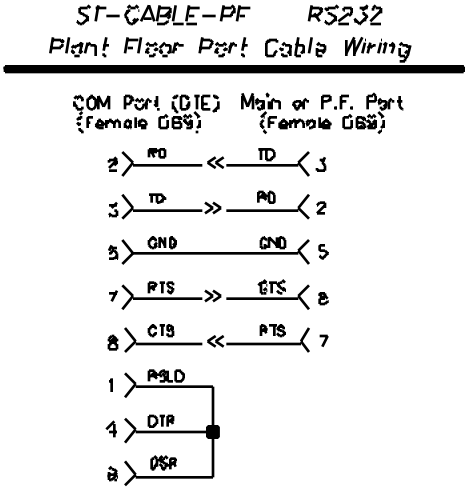
Cable from Computer to User, Main or Plant Floor RS232 Port Using Hardware Handshaking


Cable for PC COM port to Main RS232 Port or Plant Floor Port
COM Port (DTE) (Female DB25)
Main or P.F. Port (Female DB9)
COM Port (DTE) (Female DB9)
Main or P.F. Port (Female DB9)

Cable from Computer to User, Main or Plant Floor RS232 Port Using Software Handshaking


Cable for Hayes-compatible Modem to any VersaTRAK or Mini-VersaTRAK RS232 Port
Modem Port (Male DB25)
User/Main/PF Port (Female DB9)
Modem Port (Male DB9)
User/Main/PF Port (Female DB9)
* Note: Connect CTS (8) to RTS (7) as shown if the modem does not provide a CTS signal.
The CD signal is supported by VersaTRAK and Mini-VersaTRAK RTUs only.

Cable from Hayes Modem to User, Main or Plant Floor RS232 Port Using Hardware Handshaking



ST-CABLE-PF
Plant Floor Port Cable Wiring

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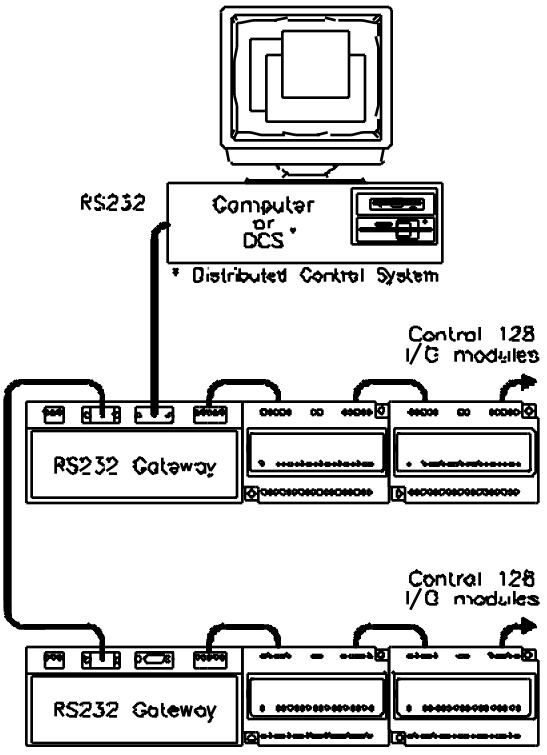
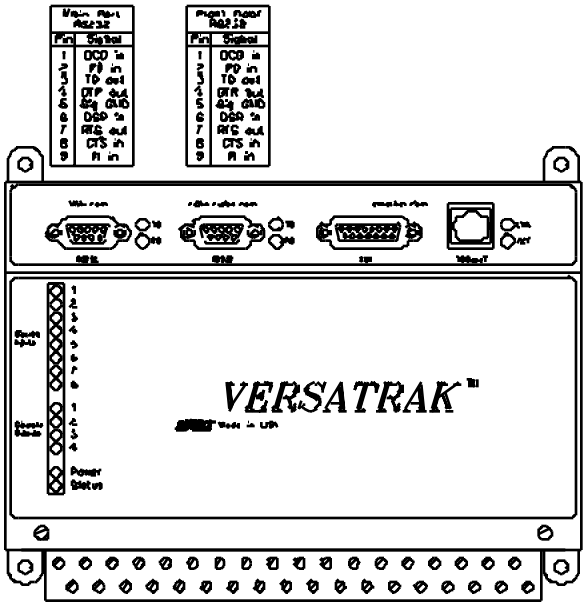
Main RS232 Port, Optional RS232 Serial Ports

These ports provide full support of the handshaking lines and flow control, making it possible to communicate through radio modems and other telemetry equipment. The pinouts for these serial ports are shown below. Cable wiring is identical for all VersaTRAK and Mini-VersaTRAK RS232 ports. Refer to the Plant Floor port cabling diagrams on the previous page for wiring information. If you are connecting two RS232 RTUs in a passthru configuration, refer to the diagram below.





Cable for RS232 Passthru Gateway to Slave RS232 Gateway

Passthru Gateway Main Port (Female DB9)		Slave Gateway Main Port or Plant Floor Port (Female DB9)
2	RD << TD	3
3	TD >> RD	2
5	GND — GND	5
7	RTS >> CTS	8
8	CTS << RTS	7

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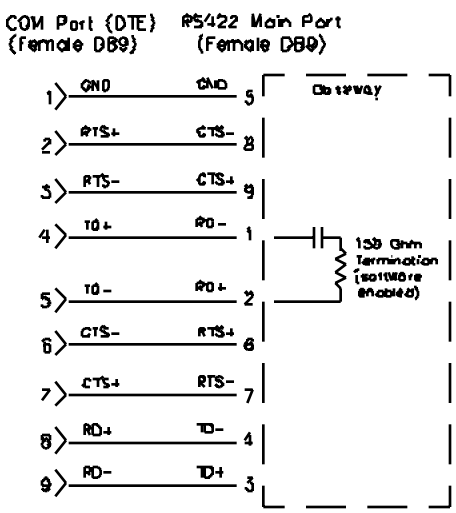
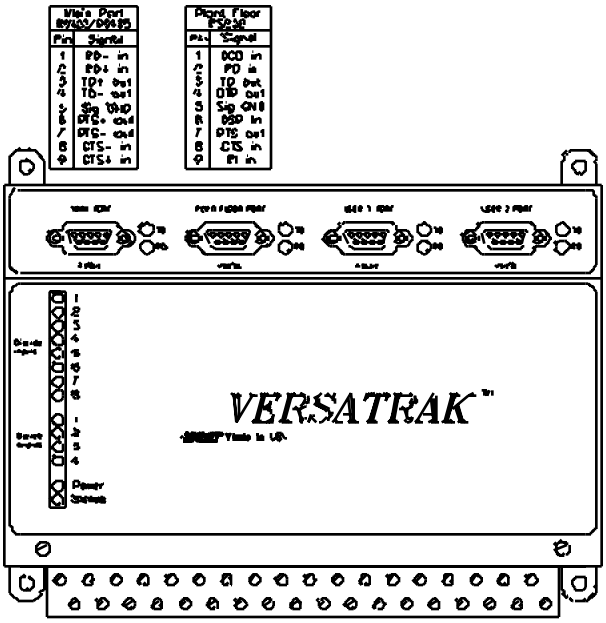
RS422/RS485 Main Serial Port

Some VersaTRAK and Mini-VersaTRAK RTUs have one RS422/RS485 port. This port provides full support of the handshaking lines and flow control, making it possible to communicate through radio modems and other telemetry equipment. The pinouts for this port are shown below.

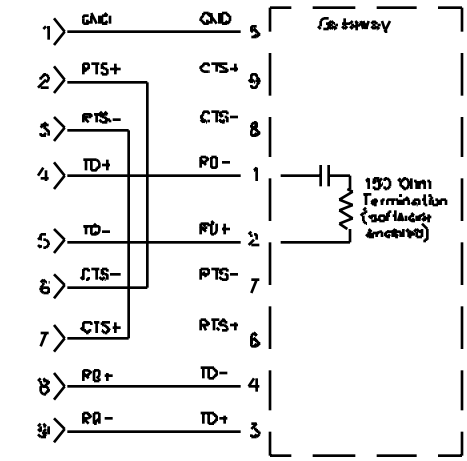
The main port communication parameters are assigned through the SIXNET I/O Tool Kit. Refer to the SIXNET I/O Tool Kit online help for more information on setting communication parameters.

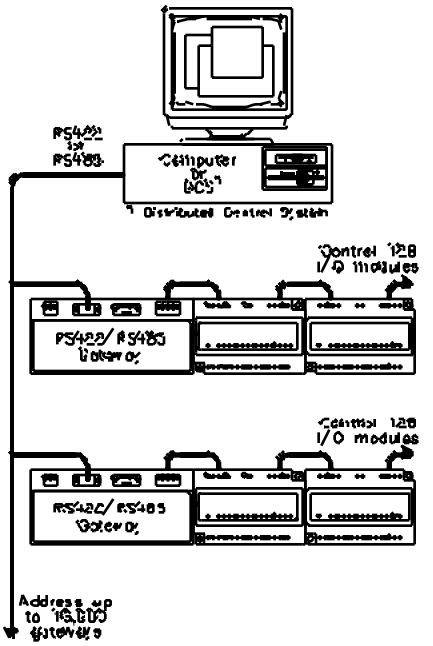
Cable for PC RS422 port to Gateway RS422 Main Port Using Hardware Handshaking





Cable for PC RS422 port to Gateway RS422 Main Port Using Xon/Xoff Handshaking





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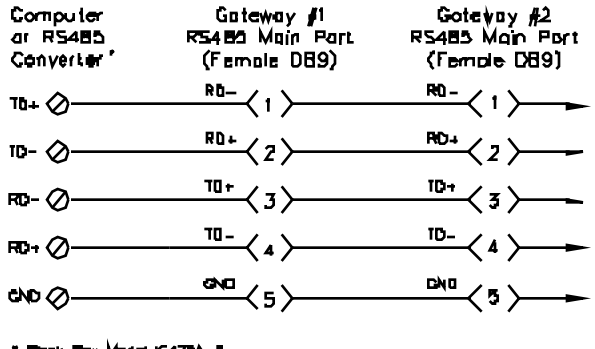
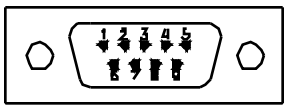
Cable for PC or Converter RS485 Port to RS485 Gateway Main Ports Using 4 Wires Plus Ground

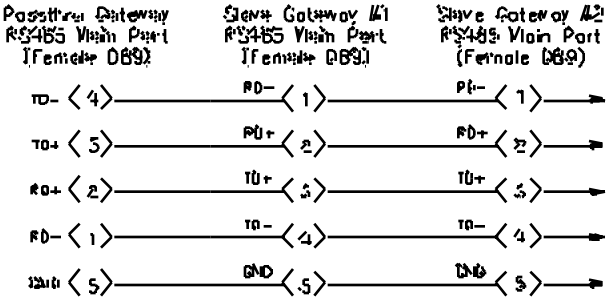


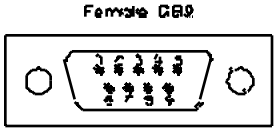
* Black Box Model IC478A-F Converter Terminals Listed Above



Female DB9 Cable Connector, Solder Side Shown

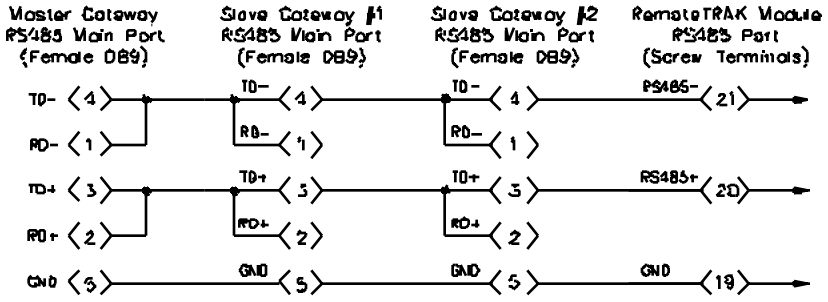
Cable for RS485 Passthru Gateway to Slave RS485 Gateways Using 4 Wires Plus Ground

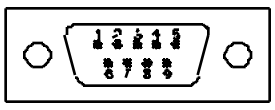




Cable Connector Pinouts, Solder Side Shown

Cable for Master SIXTRAK or VersaTRAK RS485 Port to Slave SIXTRAK, VersaTRAK or RemoteTRAK RS485 Ports Using 2 Wires Plus Ground





Cable Connector Pinouts, Solder Side Shown

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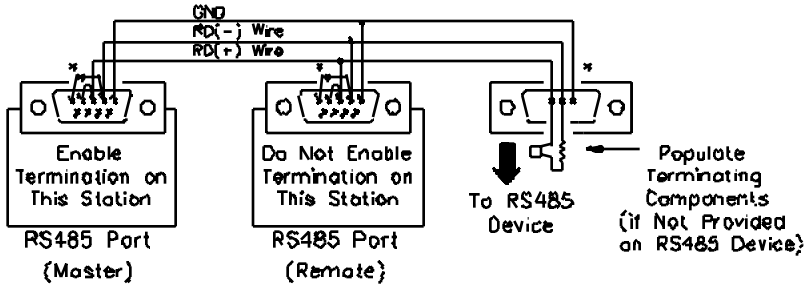
Termination Resistor

The RS422/RS485 main port has a built-in Receive Data line termination resistor. This resistor is software enabled from within the VersaTRAK or Mini-VersaTRAK Main Port Setup window of the SIXNET I/O Tool Kit. Here are guidelines for termination:

- Termination should be enabled only at both ends of an RS422 communication cable.
- Termination should be enabled only at the two end stations on an RS485 network.
- No more than two stations should be terminated on an RS485 network.

Termination components are usually built into other RS422/RS485 devices, and are typically enabled by setting a jumper or DIP switch on the device. If these components are not populated in the unit, then add them to the RS485 wiring as shown below. The components consist of a 150 Ohm resistor and a 0.1 uF capacitor connected in series.



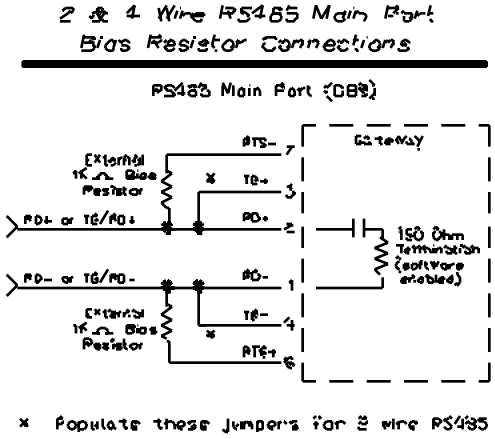
* Populate 2 jumpers at each station for 2 wire RS485 operation. Jumpers for non-Sixnet RS485 devices will vary.

Bias Resistors

On an RS485 2 or 4 wire network there should be one pair of bias resistors acting upon the receive or transmit/receive wires. If bias resistors are not present, the receive inputs on some RS485 devices may react to noise on the floating wires. The bias resistors will force the receive or transmit/receive wires to a known (non-floating) state when none of the RS485 devices are transmitting data. There should be only one pair of these resistors on the network.

Bias resistors are typically installed at the host RS485 device. Some host devices have bias resistors built-in, and are enabled through DIP switch or jumper settings. If the host does not provide bias resistors, they can be installed at any one of the VersaTRAK RS422 RTUs.

Note: If your RS485 network is made up exclusively of VersaTRAK and Mini-VersaTRAK RTUs, these bias resistors are not necessary.



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RS485 Port (VT-M2-224-xxP)

The VT-M2-224-xxP Mini-VersaTRAK has one RS485 port (User 1). This port provides two-wire RS485 communication to SIXNET or Modbus devices, with no flow control. The pinouts for this port are shown below.

The communication parameters for this port are assigned through the SIXNET I/O Tool Kit. Refer to the SIXNET I/O Tool Kit online help for more information on setting communication parameters.

RS422/RS485 Port Pinout (VT-M2-420 models only)

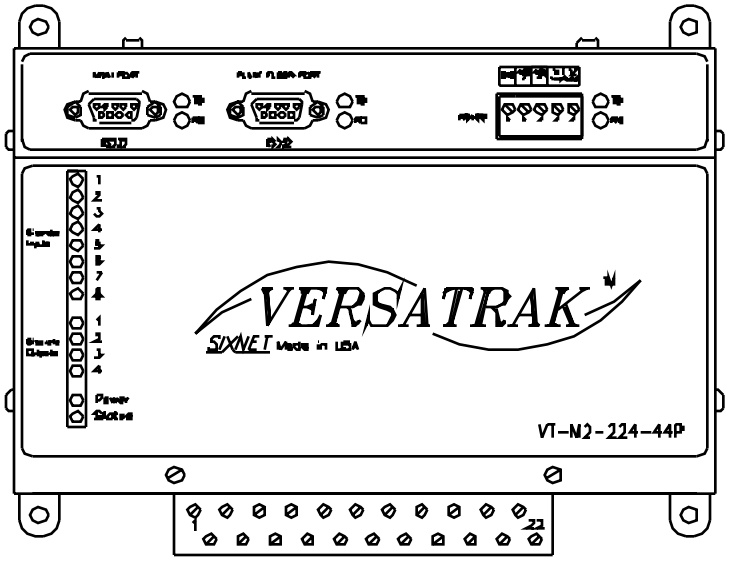
Pin	Signal	Pin	Signal
1	RD− in	6	Bias+
2	RD+ in	7	Bias−
3	TD+ out	8	NC
4	TD− out	9	NC
5	Sig GND		

RS232 Port Pinout (Main Rear port on all models & Main port on VT-M2-228 models)

Pin	Signal	Pin	Signal
1	DCD in	6	NC
2	RD in	7	RTS out
3	TD out	8	CTS in
4	DTR out	9	NC
5	Sig GND		

RS485 Port Connections (VT-M2-224 models only)

GND	485 +	485 −	T1	T2
			Terminate	



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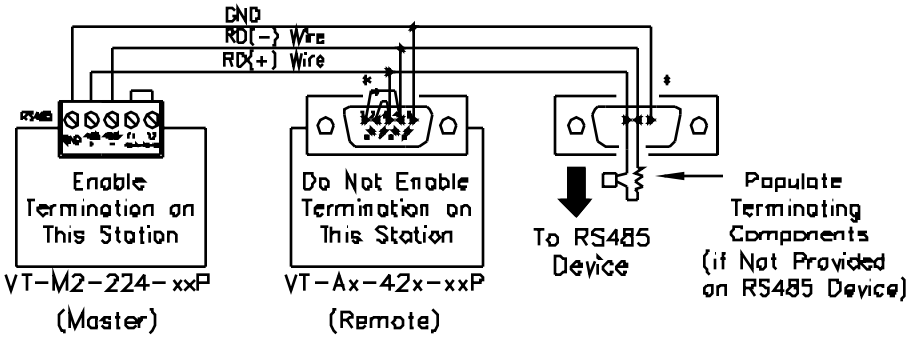
Termination Resistor

The RS485 User 1 port has a built-in Receive Data line termination resistor. This resistor is enabled by installing a jumper between the "T1" and "T2" terminals. Here are guidelines for termination:

- Termination should be enabled only at the two end stations on an RS485 network.
- No more than two stations should be terminated on an RS485 network.

Termination components are usually built into other RS485 devices, and are typically enabled by setting a jumper or DIP switch on the device. If these components are not populated in the unit, then add them to the RS485 wiring as shown below. The components consist of a 150 Ohm resistor and a 0.1 uF capacitor connected in series.



* Populate 2 jumpers at the VT-Ax-42x-xxP for 2 wire RS485 operation. Jumpers for non-Sixnet RS485 devices will vary.

Bias Resistors (VT-M2-224-xxP)

On an RS485 2 wire network there should be one pair of bias resistors acting upon the transmit/receive wires. If bias resistors are not present, the receive inputs on some RS485 devices may react to noise on the floating wires. The bias resistors will force the transmit/receive wires to a known (non-floating) state when none of the RS485 devices are transmitting data. There should be only one pair of these resistors on the network.

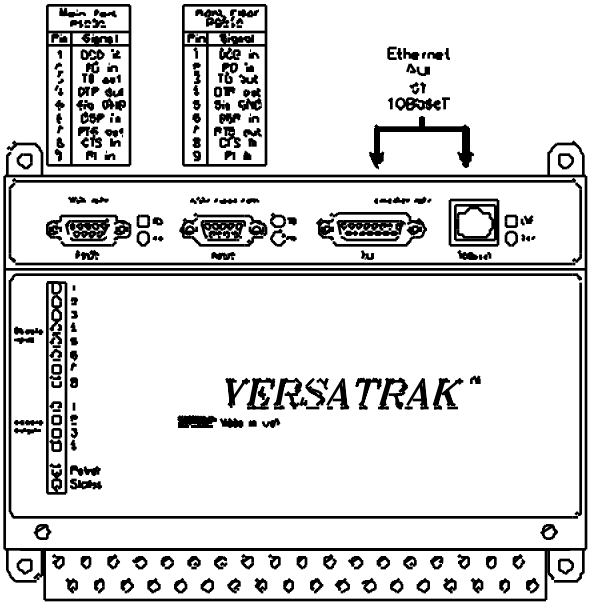
Bias resistors are provided in the VT-M2-224-xxP and are permanently enabled. If any other RS485 devices on the network have bias resistors, they should be disabled or removed from the circuit. They are often enabled or disabled through DIP switch or jumper settings.

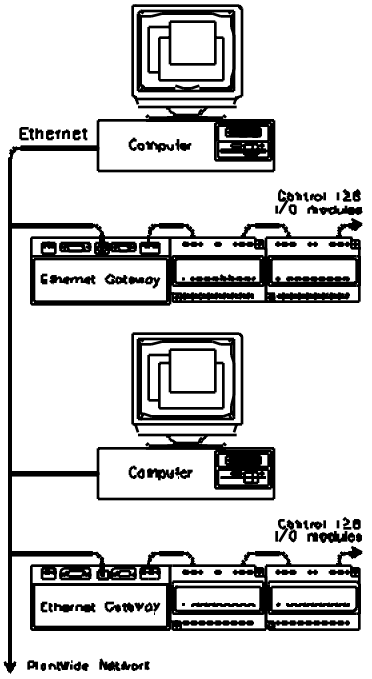
Ethernet Port

Some VersaTRAK RTUs have an Ethernet port, which can be used for communication with a host computer or other VersaTRAK RTUs. Both AUI and 10BaseT connectors are provided for cable connections. Sample cable connections to the Plant Floor port are shown on page 16.

Note: Only one Ethernet port connector (AUI or 10BaseT) can be used at any one time.

Follow standard Ethernet wiring practices with this port. The 10BaseT connector is typically used when connecting to an Ethernet hub or directly to an Ethernet card in a computer. Use the AUI connector and an appropriate AUI adapter if you are using alternate communication media such as coaxial or fiber optic cable.





Local Diagnostics

Local diagnostics can be performed through any available port while the VersaTRAK or Mini-VersaTRAK RTU is responding to messages from other ports. Diagnostic software, such as the SIXNET I/O Tool Kit, can be used to display the status of the I/O registers.

VersaTRAK Status LED

The "Status" LED on a VersaTRAK or Mini-VersaTRAK RTU should be ON continuously within 3 seconds of powerup.

SIXTRAK I/O Status LED

The "Status" LED on each SIXTRAK expansion I/O module may be observed in one of five states:

ON

The module is configured properly and communicating with the RTU.

OFF

There is no power to the module, or the status LED is being turned off intentionally by the SIXNET I/O Tool Kit during the module linking operation.

LONG BLINK
.75 sec. ON, .25 sec. OFF

Long blinking indicates one of two conditions. Either the module has lost communication with the RTU for more than 10 seconds, or the module has not received configuration data from the RTU. Upon initial system startup (no configuration in the RTU) this should be the observed LED state on each module.

SHORT BLINK
.25 sec. ON, .75 sec. OFF

Short blinking indicates a failure of the module self test upon powerup.

WINKING
10 blinks/ sec.

A status LED may be winked by the SIXNET I/O Tool Kit to bring attention to the module. This winking occurs during module linking procedure. Refer to the online help in the SIXNET I/O Tool Kit for more information.

RTU Memory

All VersaTRAK and Mini-VersaTRAK RTUs have nonvolatile (battery-free) memory for storing configuration data from the SIXNET I/O Tool Kit. They also have battery-backed memory for storage of program variables and logged data. The battery is a rechargeable lithium cell that is kept fresh by the power circuitry in the RTU. The memory retention period for an unpowered RTU is at least one year at room temperature. The retention time will be shorter at higher temperatures. The life expectancy of the lithium battery is approximately 10 years.

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Calibration

All VersaTRAK, Mini-VersaTRAK and SIXTRAK analog I/O channels are factory calibrated over all supported ranges using a regularly maintained set of standards. Factory calibration data is stored in permanent memory in the RTU or logic module, and cannot be altered. User recalibration may be performed, but is necessary only if inaccuracy in your field device is observed, or if any of the 100 ohm input shunts are replaced with low tolerance resistors.

Each analog channel has span and offset calibration settings. Span is the "range" or "gain" of the channel. Offset is the "zero" setting. Each reported analog I/O value is the product of the factory calibration value times the user calibration value. The user calibration value is defined as:

(user span value * raw value) + user offset

The user span is a unity value (1) by default. The user offset is zero by default.

Note: All factory and user calibrations are performed in software. There are no adjustment potentiometers inside the logic modules.

User calibrations are performed using the SIXNET I/O Tool Kit. Refer to the SIXNET I/O Tool Kit on-line help system for information on calibrating VersaTRAK analog I/O.

4-20 mA Shunt Replacement

All VersaTRAK and Mini-VersaTRAK 4-20 mA input channels feature a 100 ohm field replaceable shunt for each channel. These high precision shunts are located inside the RTU. If factory supplied shunts are used for replacements, recalibration will not be necessary.

Product Support

To obtain support for VersaTRAK or Mini-VersaTRAK products, call **SIXNET** and ask for Applications Engineering.

Our phone numbers are:
+1 (518) 877-5173 Office
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Clifton Park, NY 12065

Our E-mail addresses are:
support@sixnetio.com
sales@sixnetio.com

Visit our web page at:
http://www.sixnetio.com

Warranty Information

The warranty for VersaTRAK and Mini-VersaTRAK products is stated on the inside cover of this manual.

Service Information

We sincerely hope that you never experience a problem with any **SIXNET** product. If you do need service, call **SIXNET** at (518) 877-5173 and ask for Applications Engineering. A trained specialist will help you to quickly determine the source of the problem. Many problems are easily resolved with a single phone call. If it is necessary to return a unit to us, an RMA (Return Material Authorization) number will be given to you.

SIXNET tracks the flow of returned material with our RMA system to ensure speedy service. You must include this RMA number on the outside of the box so that your return can be processed immediately.

The applications engineer you are speaking with will fill out an RMA request for you. If the unit has a serial number, we will not need detailed financial information. Otherwise, be sure to have your original purchase order number and date purchased available.

We suggest that you give us a repair purchase order number in case the repair is not covered under our warranty. You will not be billed if the repair is covered under warranty.

Please supply us with as many details about the problem as you can. The information you supply will be written on the RMA form and supplied to the repair department before your unit arrives. This helps us to provide you with the best service, in the fastest manner. Normally, repairs are completed in two days. Sometimes difficult problems take a little longer to solve.

If you need a quicker turnaround, ship the unit to us by air freight. We give priority service to equipment that arrives by overnight delivery. Many repairs received by mid-morning (typical overnight delivery) can be finished the same day and returned immediately.

We apologize for any inconvenience that the need for repair may cause you. We hope that our rapid service meets your needs. If you have any suggestions to help us improve our service, please give us a call. We appreciate your ideas and will respond to them.

For Your Convenience:

Please fill in the following and keep this manual with your **SIXNET** system for future reference:

P.O. #:_____ Date Purchased: _____

Purchased From:_____

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